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Description of a new species of *Cladomelea* bolas-spider from South Africa, with notes on its behaviour (Araneae: Araneidae)

by

John Roff[1] and **Ansie Dippenaar-Schoeman**[2*]

([1]Natal National Botanical Garden, P.O. Box 21667, Mayor's Walk 3208,
South Africa; interpret@telkomsa.net; [2]Biosystematics, ARC-Plant Protection
Research Institute, P. Bag X134, Queenswood 0121 / Department of Zoology and
Entomology, University of Pretoria, South Africa; dippenaarA@arc.agric.za)
(*to whom correspondence must be addressed)

ABSTRACT

A new species of bolas-spider *Cladomelea debeeri* is described from KwaZulu-Natal, South Africa. The spider constructs a bolas-line consisting of two to three silk threads with two to three sticky droplets at the free end. The spider uses the second pair of legs to whirl the bolas-line. Whirling is done at short, erratic intervals of two to five minutes. The spider makes its retreat in a plant about 1.8 m above the soil surface.

INTRODUCTION

Several groups within the Araneidae construct reduced orb-webs, webs adapted to catch lepidopteran prey (Dippenaar-Schoeman & Leroy 1996). Some members of the subfamily Cyrtarachninae, known as bolas-spiders, produce webs consisting of only a few silk threads (Peters 1987; Scharff & Coddington 1997). The spiders first construct a few silk lines, known as trapeze-lines, from which they hang using their hind legs. A short silk thread, the bolas-line, is then constructed, with from one to several sticky globules (bolas) fixed to the free end. The bola consists of a large globule of gluey mass containing a mass of fibres (Eberhard 1980). The bolas-line is rotated, catching prey, usually moths in flight (Eberhard 1977, 1980). The globules are replaced periodically during the night. Some bolas-spiders lure their prey with a substance emitted from glands on the front legs, mimicking the sex attractant of female moths (Lopez 1987).

The Afrotropical bolas-spiders belong to the genus *Cladomelea* Simon, 1895 and are known from three species: *C. akermani* Hewitt, 1923, *C. longipes* (O.P.-Cambridge, 1877) and *C. ornata* Hirst, 1907. The latter two species are recorded from central Africa while *C. akermani* is known from South Africa. Akerman (1923) provided detailed data on web construction and the feeding behaviour of *C. akermani*. The first male of the genus *Cladomelea* was described by Leroy *et al*. (1998) for *C. akermani*. They also provided new information on web construction.

In this paper, a new species of bolas spider, based on a female specimen from South Africa, is described. Observations were made on the feeding behaviour and egg sac construction. The behaviour of the new species is compared with that of the species *C. akermani,* found in South Africa.

MATERIAL AND METHODS

The spider was studied at 45 Milliken Road, Pietermaritzburg, KwaZulu-Natal, South Africa. The spider was observed by the first author over a period of four nights during

9–12 May 2000, and photographs and a video were taken. Several observations were made each night. On 12 May the female was collected and preserved in 70% alcohol. The egg sacs were kept for observation until June 2000.

The type material is housed in the National Collection of Arachnida (NCA), at the Plant Protection Research Institute, an institute of the Agricultural Research Council.

TAXONOMY

Genus *Cladomelea* Simon, 1895

Cladomelea Simon, 1895: 886; Leroy *et al*. 1998: 8; Levi 2003: 378.
Type species: *Cyrtarachne longipes* (O.P.-Cambridge, 1877), by original designation.

According to Levi (2003) the three genera in the bolas-spider group, *Mastophora* Holmberg, *Ordgarius* Keyserling and *Cladomelea* have outgrowths on the carapace. Based on Leroy *et al*. (1998) *Cladomelea* is characterised by the following: it is the only genus in the subfamily where the female lacks a row of strong spines on the anterior legs. In *Cladomelea* the spines are replaced by a dense layer of thin, long setae (Leroy *et al*. 1998: 5). A double row of teeth is present on the inferior cheliceral margin with denticles scattered in between. The new species contains all these characteristics.

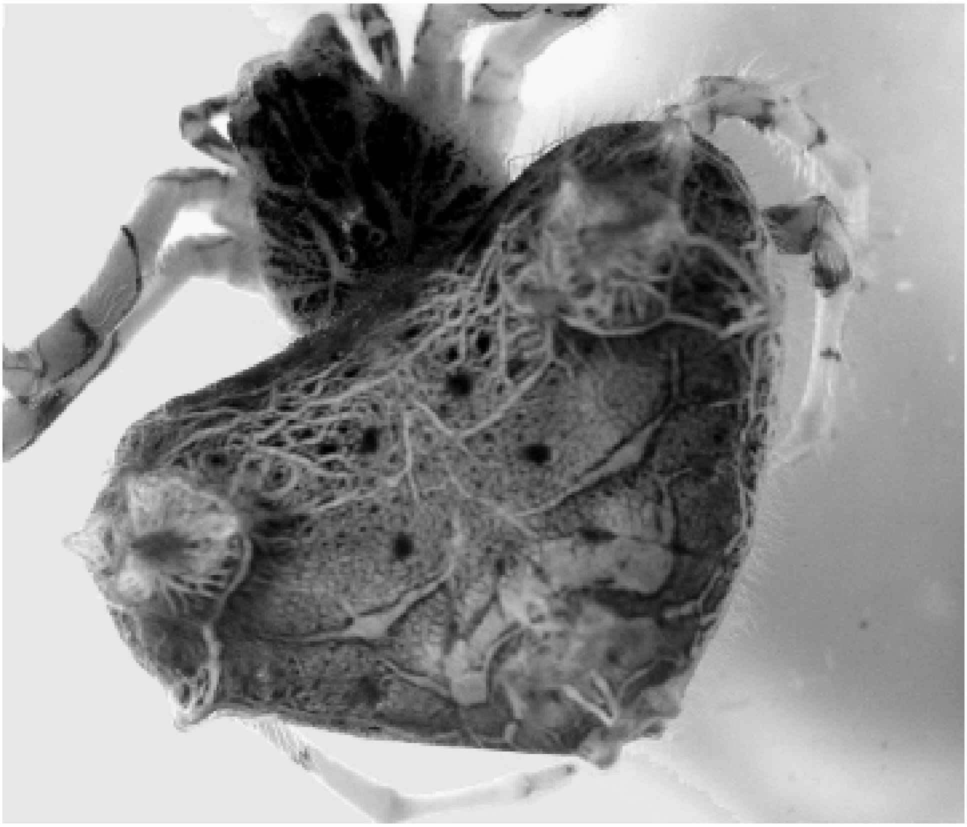


Fig. 1. *Cladomelea debeeri* sp. n., dorsal view of body.

Cladomelea debeeri sp. n.

(Figs 1–4)

Type material: Holotype female collected at 45 Milliken Road, Pietermaritzburg (29°38'S: 30°28'E), KwaZulu-Natal, South Africa, approx. 600 m above sea level, 12 May 2000, J. Roff (NCA 2003/ 1657).

Etymology: The species name is a patronym in honour of Len de Beer, a friend of the first author, who assisted in the collection of the type specimen.

Diagnosis: The abdomen is triangular and bears prominent tubercles (Fig. 1) arranged in clusters of five, each on the antero-median corners of the abdomen. Each tubercle bears a tuft of long setae (Fig. 2). In the other three species of *Cladomelea,* the abdomens are decorated with short, blunt tubercles scattered over the dorsal surface, without tufts of setae. *Cladomelea debeeri* is distinct in having four short prominent tubercles on the carapace (Figs 3, 4) compared to the three very long and slender tubercles present in the other three species.

Description: Female.

Total length 15.84 mm; carapace length 3.84 mm; abdomen length 12.58 mm (abdomen partly covers carapace); carapace width 3.92 mm; abdomen width 12.0 mm.

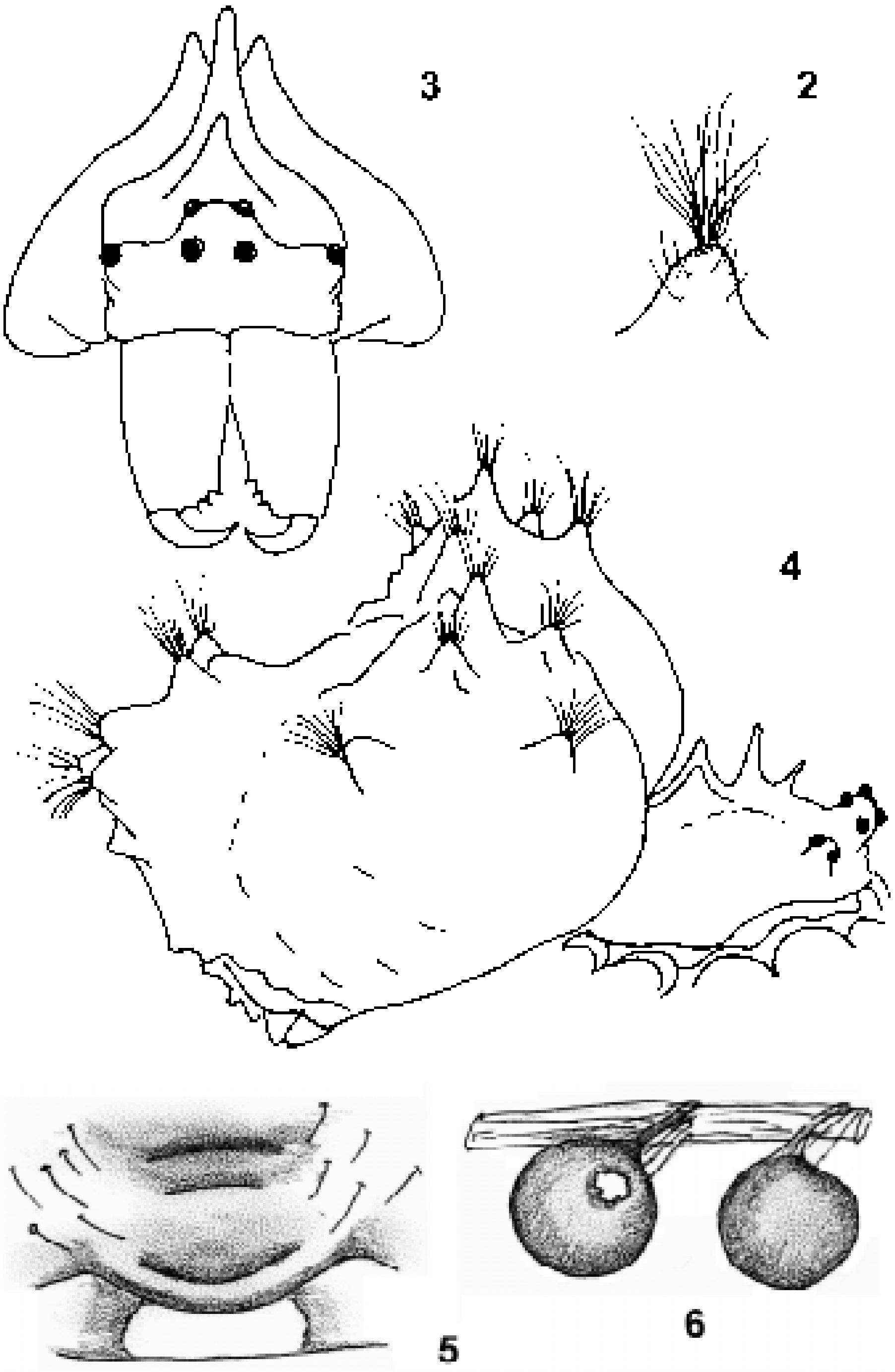
Carapace: Yellowish brown, decorated with an intricate dark brown pattern, consisting of medially dark spots and striae; pear-shaped, truncated anteriorly; covered with long white woolly setae; cephalic region slightly raised, bearing a row of strong tubercles (1:1:2); the medial tubercle is the largest with a shorter tubercle in front and a pair of shorter tubercles behind (Figs 3, 4); clypeus yellowish brown with brown spots laterally; chelicerae yellowish brown with dark spots medially and brown markings laterally; sternum creamish white; mouthparts brown, paler around edge; eyes in two slightly recurved rows; anterior median eyes and posterior median eyes on common eye tubercle (Fig. 4); anterior median eyes slightly larger than posterior median eyes; lateral eyes adjacent on shallow tubercles, equal in size; median ocular quadrangle wider than long; cheliceral fang furrow with three teeth on posterior margin and a group of denticles scattered in between; sternum width 1.6 mm, length 1.76 mm.

Abdomen: Creamish yellow; triangular in shape (Fig. 1); each corner studded with five prominent tubercles (Fig. 4); each tubercle cream at base and dark at apices, bearing a tuft of long white setae (Fig. 2); posterior corner with six tubercles, each bearing hair tufts; spinnerets dark.

Epigynum: Lacks a scape, with only a small rounded lip (Fig. 5).

Legs: Creamish white with dark spiralling bands on femora, patellae and tibiae; metatarsi with longitudinal bands; legs without strong setae but bearing dense long hair-like setae; leg measurements (mm):

	femur	patella	tibia	metatarsus	tarsus	total
I	4.24	1.92	4.0	3.6	0.96	14.72
II	4.40	1.76	4.0	3.3	0.80	14.26
III	2.40	0.96	1.6	1.2	0.56	6.72
IV	3.44	1.60	1.12	1.84	0.56	8.56



Figs 2–5. *Cladomelea debeeri* sp. n. 2. Abdominal tubercle with tuft of setae. 3. Cephalothorax, anterior view. 4. Outline of body, lateral view. 5. Epigynum. 6. Egg sacs.

Behaviour:

The spider was first encountered at 07:45 on 8 May 2000. Observations on the spider were made on four consecutive nights thereafter.

Retreat: The spider was first observed hanging from a trapeze-line made about 1.8 m above the soil surface. The threads were attached to a branch of an *Azalea* bush. When found, the spider was feeding on a moth, which it dropped when disturbed. The spider moved up the trapeze-line to a retreat consisting of two leaves pulled together with a few strands of silk. The spider remained in the retreat throughout the day until the evening (17:44) when it was found hanging from the trapeze-line, below the retreat, busy constructing a bolas-line.

Bolas-line: The bolas-line consisted of a thread constructed of multiple strands of silk, with three sticky droplets adhering to it. Each droplet was approximately 2–3 mm in diameter. First a long silk thread with a single droplet was produced; a slightly shorter thread with a second droplet was then made; a third thread, which was the shortest, with another droplet, was finally made. The end result was a three-strand thread held together with three droplets, positioned one above the other. Observations on two other nights showed that the spider made a bolas-line in the same fashion, but the number of droplets varied from two to three.

Operating the bolas-line: The spider used its fourth leg to hold onto the trapeze-line. The bolas-line was then whirled at intervals, using the second pair of legs. Initially, the whirling happened at intervals of about five minutes, but later became more frequent,

TABLE 1

Comparison of the behaviour of two South African species, *Cladomelea akermani* and *Cladomelea debeeri* sp. n.

Cladomelea akermani	*Cladomelea debeeri* sp. n.
Hunting site	
Generally found on grass stems	Collected from tree layer up to 1.8 m above soil surface
Retreat	
None. Spider found on grass with legs curled up around body	Found in retreat made of leaves attached with silk threads
Activity period	
Sunset to about midnight	Sunset to sunrise
Bolas-line	
Single thread with 1–2 droplet	2–3 threads with 2–3 droplets
Leg involvement	
Leg I held straight out and swung back and forth	Leg I held straight out
Leg II held bolas-line and acts as the axis around which the body oscillates and bolas rotate	Leg II used to hold and whirl the bolas-line
Leg III hold onto trapeze-line	Leg III unused
Leg IV hold onto trapeze-line	Leg IV hold onto trapeze-line
Whirling of web	
Vigorous whirling	Less vigorous, erratic whirling with intervals of 1–5 min

with intervals of between one to two minutes. The third pair of legs did not seem to be used during the prey-catching process. The spider constructed a new bolas every one to two hours. On the evening of 10 May the spider responded to the noise of a nearby car engine by rapidly increasing the rate of whirling. This suggests that the vibration of a moth's wings while in flight would elicit a similar response. Except for the first evening, when the spider was observed feeding on a moth, no prey was caught during the observation period. The female was eventually collected and preserved in 70 % alcohol on the 12 May 2000.

Egg sacs (Fig. 6): The female was found with two egg sacs attached to a twig near the spider's retreat. They were fastened to the twig with irregular silken threads on the lower side and resembled dead leaves. The egg sacs were round (diameter 11 mm), beige, with a very tough outer layer consisting of closely woven silk. One egg sac was manually opened on 15 June but the spiderlings were still underdeveloped. The young spiders (between 150 and 200) emerged from this egg sac on 16 July, clustering close to the cocoon. They dispersed fairly rapidly, some by ballooning, and by 18 June only two or three were left.

In Table 1 the behaviour of the two South African bolas spiders is compared. The behaviour of *C. akermani* is based on the observations of Leroy *et al*. 1998, which differ from those of Akerman (1923). The two species differ both in their choice of hunting site and in the construction and handling of the bolas-line.

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